Chapter 5 · Arithmetic Progressions

Part 8 · Number Search & Magic Square

Work out each answer below, then find it hidden in the digit grid — across, down, diagonally or backwards.

1. The 10th term of the AP 2, 7, 12, …
2. Magnitude of the 30th term of the AP 10, 7, 4, … (ignore the sign)
3. Which term of 21, 18, 15, … equals −81
4. How many two-digit numbers are divisible by 3
5. nth term of the AP a=0, d=10, at n=10
6. The 29th term of an AP with a=8, d=2 (Guided Practice example)
7. Sum of the first 15 multiples of 8
8. Number of rows of rose plants going from 23 down to 5, decreasing by 2 each row
9. Number of the first 15 multiples of 8 being summed (count of terms)
10. The common difference used in the ladder-rung example, times ten (|d|=2, so this is 10×|d|+1)

5	9	3	8	2	1	6	4	0	8	1	2	7
2	4	8	0	7	7	2	0	7	2	5	9	9
6	1	4	7	7	5	0	5	2	2	4	2	7
5	8	0	8	3	2	3	3	7	8	1	1	5
5	0	6	4	5	1	4	0	4	8	1	4	7
7	4	8	1	7	9	0	4	3	7	8	0	8
1	0	3	9	0	0	5	3	4	9	1	6	0
8	6	6	5	7	1	0	2	5	0	9	9	3
3	6	3	5	6	1	5	0	2	1	1	4	3
2	7	9	7	1	3	9	5	4	0	7	2	4
4	6	8	7	3	6	4	1	5	3	8	2	5
9	0	3	1	7	9	9	9	1	3	9	0	6
5	4	0	2	1	6	1	5	3	2	8	0	2

☐ 960	☐ 47	☐ 77	☐ 35	☐ 30
☐ 90	☐ 64	☐ 10	☐ 15	☐ 21

Magic Square — every row, column and diagonal adds to the same total.

Nine consecutive terms of the AP 5, 10, 15, … (first term 5, common difference 5).

		30
15		**35**
20	**45**	

Magic constant: 75. Fill the empty cells.

Concept Bingo

Fill the empty grid below with any 16 terms from the bank — in any order, one per box. Then work down the clue list: each clue describes one term without naming it. Cross off a box only when you are sure which term its clue is describing. Get four crossed in a row, column or diagonal and you have bingo.

Term bank — choose any 16:

Arithmetic Progression	Term	Common difference	First term
nth term	General term	Sum of n terms	Finite AP
Infinite AP	General form	Last term	Common difference test
Simple interest AP	Gauss trick	Consecutive terms	Positive integer n
Quadratic in n	Reverse and add		

Your bingo card:

Clue list — read each clue and find the term it describes:

① A list of numbers in which each term (after the first) is obtained by adding a fixed number to the one before it.

② A single number in a list, such as a_1, a_2, or a_n.

③ The fixed number added to each term of an AP to get the next term.

④ The very first number in an AP, usually written a.

⑤ The general term of an AP, given by the formula $a+(n-1)d$.

⑥ Another name for the nth term, a_n.

⑦ The result of adding up the first n terms of an AP, written S_n.

⑧ An AP that has a last term.

⑨ An AP that goes on forever with no last term.

⑩ The pattern $a, a+d, a+2d, a+3d, \ldots$ that every AP follows.

 The final term of a finite AP, sometimes written l.

 Checking that $a_{k+1} - a_k$ stays the same for every k to confirm a list is an AP.

 The context in which yearly simple-interest amounts form an AP.

 The method of writing a sum forwards, then backwards, then adding to find S_n quickly.

 Terms that follow one another directly in the list, with no gaps.

 What n must always be in the formula $a_n = a + (n-1)d$ — never a fraction or negative.

 The type of equation in n that sometimes appears when solving for n given S_n.

 Gauss's trick, used to derive the formula for the sum of the first n terms.

One idea — add the same fixed number every time — builds an entire toolkit: a formula for any term, and a formula for any sum. Once you can find a and d from almost anything you are given, the rest is just careful substitution. □